REMARKS

In the Office Action, claims 1-7, 22, 24-31, 46 and 48 stand rejected under 35 U.S.C. § 102 as allegedly anticipated by U.S. Patent No. 5,995,486 to Illiadis ("Illiadis"), and claims 8-18, 21, 32-42 and 45 stand rejected under 35 U.S.C. § 35 U.S.C. § 103 as unpatentable over Illiadis in view of U.S. Patent No. 6,456,590 to Ren. Claims 1-48 are pending in the application. Further, the Examiner objects to claims 23 and 47 as being dependent on a rejected base claims and claims 19-20 and 43-44 are allowed. Applicants respectfully traverse the rejections and request reconsideration in view of the foregoing amendments and following remarks. Claim 29 has been amended by the Applicants. Upon entry of this Amendment, Claims 1-48 are pending in the application.

Allowable Matter

Applicants thank the Examiner for allowing claims 19-20 and 43-44 and for acknowledging that the allowable subject matter of claims 23 and 47. Regarding claims 1 and 25, Applicants respectfully submit that base claims 1 and 25 are allowable and, accordingly, that claims 23 and 47 should be allowed in their current form.

Claim Rejections Under 35 U.S.C. § 102(a)

The Office Action relies on Illiadis in rejecting claims 1-7, 22, 24-31, 46 and 48 under 35 U.S.C. § 35 U.S.C. § 102. Illiadis teaches a flow control system that sends start and stop commands to generate "backpressure" for a connection in a network (*see* col. 2, line 60 – col. 3, line 20). Illiadis calculates an anticipated data flow after a stop command is sent and uses the anticipated data flow calculation and buffer usage to determine when a stop command should be sent (col. 3, lines 3-20). However, regarding multiple connections, Illiadis states that its "flow control mechanism…for a single connection is <u>readily applicable independently for each one of the connections</u>" and teaches the need for both dedicated and shared buffers "to avoid deadlock problems" (*see* col. 8, lines 27-67). Illiadis further teaches that "a better buffer utilization is achieved by sharing a part of the available buffer among all existing connections," and that "[i]t is seen as an advantage of this embodiment that, when a few congested connections occupy the shared buffer, the other connections remain able to transmit cells using their dedicated buffer

portions" (see Illiadis at col. 8, line 61 – col. 9, line 13). Thus, Illiadis provides shared buffers as an overflow to private buffers and flow control for each connection is based on the condition of private buffers dedicated to the connection.

In contrast, claims 1 and 25 require a flow control means for pausing and unpausing senders on selected links based on remaining available buffer space of the shared buffer. For example, claim 1 specifically requires, *inter alia*: monitoring the remaining available buffer space AS of the shared buffer; estimating the expected total content LE of the links; calculating a free margin (FM) as the remaining available buffer space minus the expected total content of the links FM=AS-LE; if the free margin sinks below a threshold AS-LE < A, then a selected link is paused; and if the free margin thereafter raises above a threshold AS-LE> B, then a selected paused link is un-paused. As shown above, where Illiadis addresses multiple connections, it specifically teaches controlling individual connections based on the state of private dedicated buffers. More particularly, Illiadis provides no suggestion of controlling flow of selected communication links based on the state of a shared buffer. Even if Illiadis were read liberally, Illiadis teaches a global emulator for estimating available buffer space that "is driven by a compounded start/stop signal process of all the connections" (col. 10, lines 6-14). Clearly then, a fair reading of Illiadis requires the conclusion that Illiadis teaches individual flow control for each connection based on the use of private dedicated buffers. Therefore, it cannot be said that Illiadis teaches or suggests the flow control means for pausing and un-pausing senders on selected links recited in claims 1 and 25.

Regarding claims 2 and 26, Illiadis teaches that an upstream node stop transmission of traffic upon receipt of a stop signal and resumes the transmission of traffic upon receipt of a start signal (col. 4, lines 63-65). However, claims 2 and 26 require a pause frame generator for generating pause frames to be sent to data senders in order to pause senders on a selected link, and generating un-pause frames to be sent to data senders in order to un-pause senders on a selected paused link. Illiadis merely sends a signal to a node that, in response, stops transmission of traffic and Illiadis is not concerned with individual senders on a link. As described above, Illiadis teaches flow control for individual links, based on dedicated buffer usage and in dealing with multiple connections, Illiadis merely teaches methods for calculating usage of shared buffer based on compounded inputs received from individual flow control mechanisms (col. 10, lines 6-

14). Thus, Illiadis cannot be said to anticipate the recited pause frame generator of claims 2 and 26.

Regarding claims 3-7 and 27-31, Illiadis teaches an emulator based on a single link and compounds flow control mechanisms in handling multiple links. However, Illiadis does not teach a link estimate based on a model of the behavior of each port, the summing of the contents of all the input links and does not teach taking into account different link lengths and bit rates nor the model of behavior of each port as required in the claims.

Regarding claims 22, 24, 46 and 48, Applicants respectfully submit that the rejections of these claims are based on a misapplication of cited equation 7 of Illiadis. The claims require the pausing of a link if free margin drops below a threshold B and unpauses when the free margin rises above threshold B, where the threshold value is set to zero. In contrast, equation 7 of Illiadis includes a condition V (s_n) =B that the Office Action apparently suggests a threshold set to zero. However, in the cited equation, the stop signal is generated based on a calculated maximum possible queue length and at a time when the maximum possible queue length is explicitly less than the buffer size (see equation 7 "V_t < B" and col. 6, lines 13-28). Thus, Illiadis does not teach pausing based on free margin falling below a threshold and unpausing when free margin rises above a threshold, but instead teaches generating a stop signal based on prospective maximum queue length. Because Illiadis does not teach the elements of the claims, the rejections should be withdrawn.

Claim Rejections Under 35 U.S.C. § 103(a)

In the Office Action, claims 8-18, 21, 32-42 and 45 stand rejected over Illiadis in view of Ren. Applicants respectfully submit that Ren does not cure the deficiencies of Illiadis. Ren is teaches shared memory Ethernet switches that use two flow control schemes that vary only in the method by which shared memory is partitioned (*see* col. 6, lines 58-66). In particular, Ren teaches a fixed partitioning of memory to individual ports and a "dynamic threshold scheme [that] allocates more memory to the ports that need more memory" (col. 6, line 58 – col. 7, line 7). As with Illiadis, Ren merely controls flow by allocating more memory queues associated with high traffic links and by pausing each link based on the condition of a queue associated with the link to be paused (*see* col. 11, lines 18-38).

In contrast, the claims under §103 rejection recite elements associated with a number of output ports sharing a buffer space and a flow control means for pausing and un-pausing senders on selected links based on free margin of the shared buffer. For example, claims 11-18 and 35-42 require that most offending senders are paused first and least offending senders are uncaused first. These claims are operative to control flow in a system using shared buffer space. Neither Illiadis nor Ren teach such control methods because both references pause individual links based on the content of queues dedicated or allocated to those links.

In another example, offending senders are tracked using an overflow sum counter as recited in claims 13-16, 18, 37-40 and 42. The Office Action suggests that Ren teaches such an overflow sum counter. However, as cited, Ren teaches a virtual input queue implemented as a counter for an input port that clearly is not contemplated as an overflow sum counter since it merely tracks the number of bytes in a virtual queue (col. 8, line 37-43). Thus Ren cannot be said to render obvious any claim of the present Application that operates on or monitors the overflow sum counter. For example, claims 14-15 and 38-39 require increasing the overflow sum counter when an input port sends a packet to a congested output. Ren does not teach or otherwise suggest such relationship between input and output port and any congestion tracking counter.

The other rejections of the claims are similarly lacking. For example, Ren does not teach or suggest a link estimate based on a model consisting of a curve having different segments as required by claims 5-10 and 29-34. Ren discusses models and curves only as a means for modeling performance expected from a Ren switch and for plotting results of the modeling in a curve in Figure 9 (*see* col. 18, line 40 *et seq.*). In another example, claims 21 and 45 require overflow sum counters to be decreased linearly with time. As cited in the Office Action, Ren neither teaches nor suggests an overflow sum counter nor decreasing <u>any</u> counter linearly with time.

Therefore, for at least these reasons, the rejections of claims 8-18, 21, 32-42 and 45 are improper and should be withdrawn.

Additional Claim Amendments

Applicants have amended claim 29 to correct a minor typographical error.

Conclusion

All objections and rejections having been addressed, and in view of the foregoing, the claims are believed to be in form for allowance, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,
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